SVANTEK

USER MANUAL

SV 111

VIBRATION CALIBRATOR

Warsaw, 2024-07-05

Rev. 1.05

Note: *Because of continuous product improvement SVANTEK reserves the right to make changes to product specifications without notice. To download the most up to date user's manual please visit our web site at www.svantek.com. This user's manual presents the firmware revision named* ***1.16.x****.*

The succeeding software revisions (marked with the higher numbers) can change the view of some displays presented in the text of the manual.

WEEE Notice: *Do not throw the device away with the unsorted municipal waste at the end of its life. Instead, hand it in at an official collection point for recycling. By doing this you will help to preserve the environment.*

Technical Support Contact Information:

web: www.svantek.com/contact

CONTENTS

1 General safety summary

Review the following safety precautions to avoid injury and prevent from damaging this product or other products connected with it. To avoid potential hazards, use this product only as specified. Qualified personnel should only perform the service procedures.

Warnings, precautions and maintenance:

- Before using the calibrator be sure that the shaker shipping lock is detached. Starting the vibration calibrator with the shipping lock may destroy it.
- Use a proper AC/DC adapter, specified for this product and certified for the country of its use.
- Keep the product's surfaces clean and dry.
- Even when the device is not in use it is recommended to charge the battery once a month to keep it in good condition.
- It is recommended to carry out a technical inspection and recalibration of the device every 12 months to ensure accurate calibration level.
- Recalibration can be made by the calibration laboratory. If there is no possibility to recalibrate the device by calibration laboratory the device should be send to the manufacturer.
- All maintenance work and repairs can only be done by the personnel trained by the manufacturer.
- Handle with care.

Safety terms and symbols:

Symbol	Symbol meaning
	Do not throw into standard municipal waste containers. The user is obliged to deliver used equipment to the manufacturer or to the recycling collection point.
	This product can be recycled
	This product has met EU consumer safety, health or environmental requirements

2 Calibration

One of the fundamental questions most often asked when taking a measurement is whether the result is accurate. Proceeding with a measurement without having a positive answer to this question may result in obtaining data that is of no practical use and wasting our time. However, we can easily obtain the answer by calibrating the vibration level meter using a vibration calibrator. This device should be used before each set of measurements.
The vibration calibrator is a device that produces vibration at a defined level and frequency. It allows the vibration meter to be calibrated in a comparative way.
The calibration procedure is also the best way to check the complete measuring system (instrument, cable and transducer connected together). This is essential for reliable measurements in the field!

3 Accuracy of calibration

Every measurement made by any measurement device is subject to error. The result of such a measurement is only an estimate of the real value of the measured quantity. Therefore, the purpose of calibration is to limit this unavoidable error to a certain acceptable level. The maximum absolute value of the error of the generated vibration signals is called the tolerance and is strictly defined by the ISO8041:2017 standard.

4 SV 111 general information

- SV 111 is a portable vibration calibrator designed to check/calibrate various types of vibration level meters according to ISO 8041-1:2017.
- Three standard frequencies 15.92 Hz, 79.58 and 159.2 Hz (plus an additional 636,6Hz) combined with high load mass provide the ability opportunity to calibrate almost any existing transducer.
- Using special adapters, the SV 111 can take measurements in three directions to effectively calibrate tri-axial transducers.
- With its own internal rechargeable battery, it is a truly mobile and flexible instrument that can be used both in the laboratory and in the field.
- The unique feature of SV 111 is the ability to calibrate a complete “seat accelerometer” without the need to remove the accelerometer from the rubber pad!
- The robust case allows the calibrator to be placed directly on the ground, which is extremely useful in field applications.
- A built-in electronic levelling system helps to position the instrument correctly for correct vibration calibration. Levelling the SV 111 is important to keep the lateral vibration levels within the tolerances specified in ISO 8041-1:2017.

5 Unpacking and inspecting the package contents

Despite careful packaging, the risk of damage to the instrument cannot be completely eliminated. On delivery, please check that the unit is undamaged and that you have received all the equipment and optional accessories (if ordered). In case of any problems, please contact an authorised Svantek representative, the service staff or the manufacturer directly. The complete kit contains the following items:

- SV 111 Vibration calibrator
- SA 33 AC/DC adapter

Before using the instrument:

- Ensure that the shaker's transport lock is removed. Starting up the vibration calibrator with the transport lock may destroy it.

To remove the shaker transport lock, use the Allen wrench and two screwdriver tips to unscrew the four screws attached to the magnet. Screw the central screw into the loose sleeve.

Do not throw away the transport lock with three screws, as it is necessary to secure the shaker during transport!

- Fully charge the SV 111. To charge the battery, connect the SA33 AC/DC adapter plug to the SV 111 EXT_DC supply socket and then connect to the mains.

The SA33 AC/DC adapter is inserted into the special slot on the SV 111.

- If the instrument has been stored or transported at a low temperature (below 0 °C), it is recommended that it be left at room temperature for a few hours before being plugged in. In case of condensation, it is recommended to leave the instrument unplugged for 4 to 8 hours until the external surface is dry.

6 Optional accessories

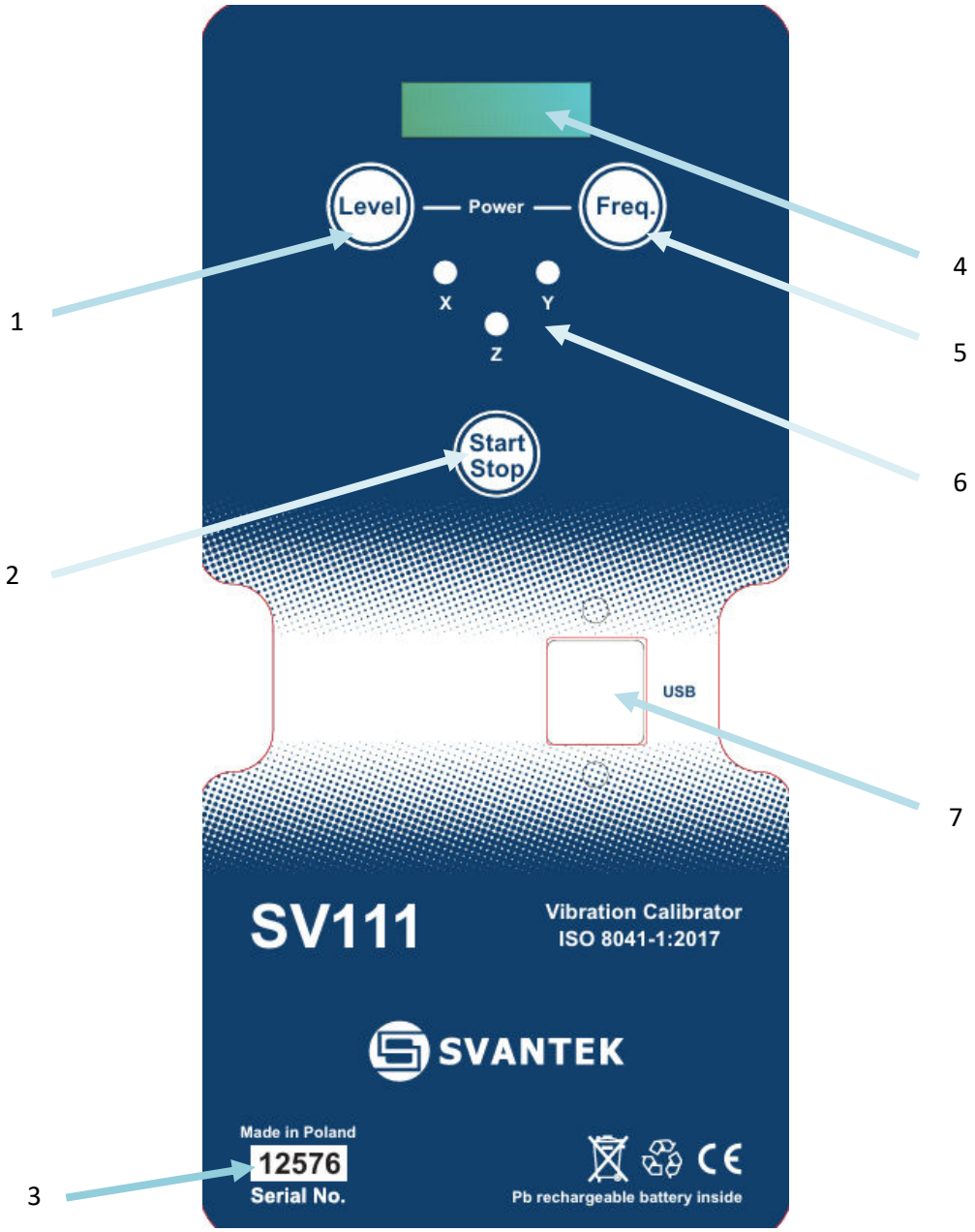
The SV 111 calibrator kit doesn't include the SA 105 adapter used to calibrate the SV 105B hand-arm transducers and the SA 44 adapter used to calibrate the SV 3023M2 transducers. These adapters are optional and must be ordered separately.

7 SV 111 vibration calibrator

SV 111 vibration calibrator

1.Magnet with two screwdriver tips; 2.Adapter; 3.Slot for the Hex wrench, support sleeves and 6 screws (3x10mm and 3x15mm); 4.Slot the charger; 5.Shaker; 6.Transportation lock; 7.Support; 8.Fastening screw; 9.Display; 10.Keyboard; 11.EXT_DC supply socket; 12.USB port

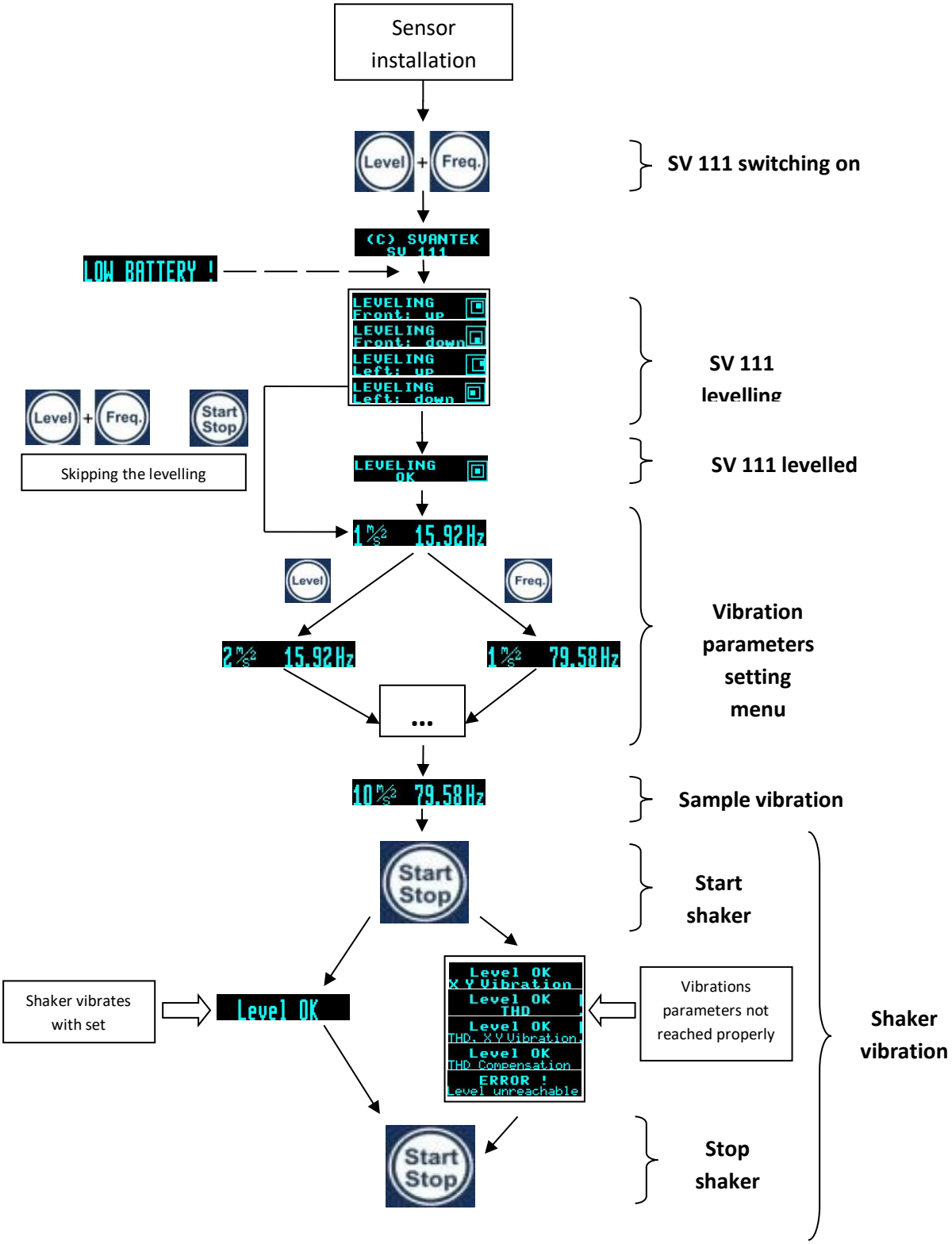
8 Control panel



SV 111 control panel

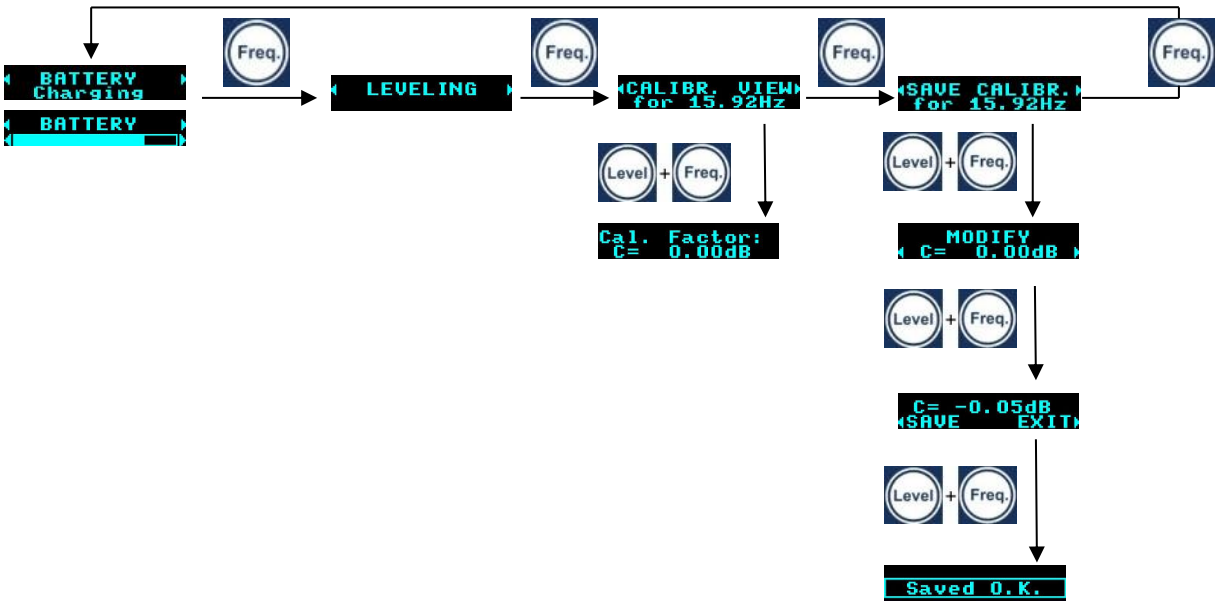
1.Vibrations level button/Power on button A; 2.Start/Stop button; 3.Serial number box; 4.Display box; 5.Vibration frequency button/Power button B; 6. Spirit level; 7.USB port

9 Operating diagram



10 Submenu diagram

- Program submenu can be accessed from the “Vibrations parameters setting menu” by pressing 



- To return to the “Vibrations parameters setting menu” press 

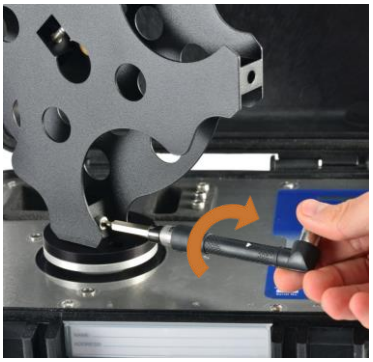
11 Calibration of the whole-body sensor

The whole-body sensor should be tested/calibrated at 15.92 Hz only!

- Dismantle the adapter from the case cover and screw it to the shaker with one or more 15mm long screws (one central screw should be sufficient for the system check).


- Dismantle the support system from the case holder, place it on the adapter and tighten the fixing screw.



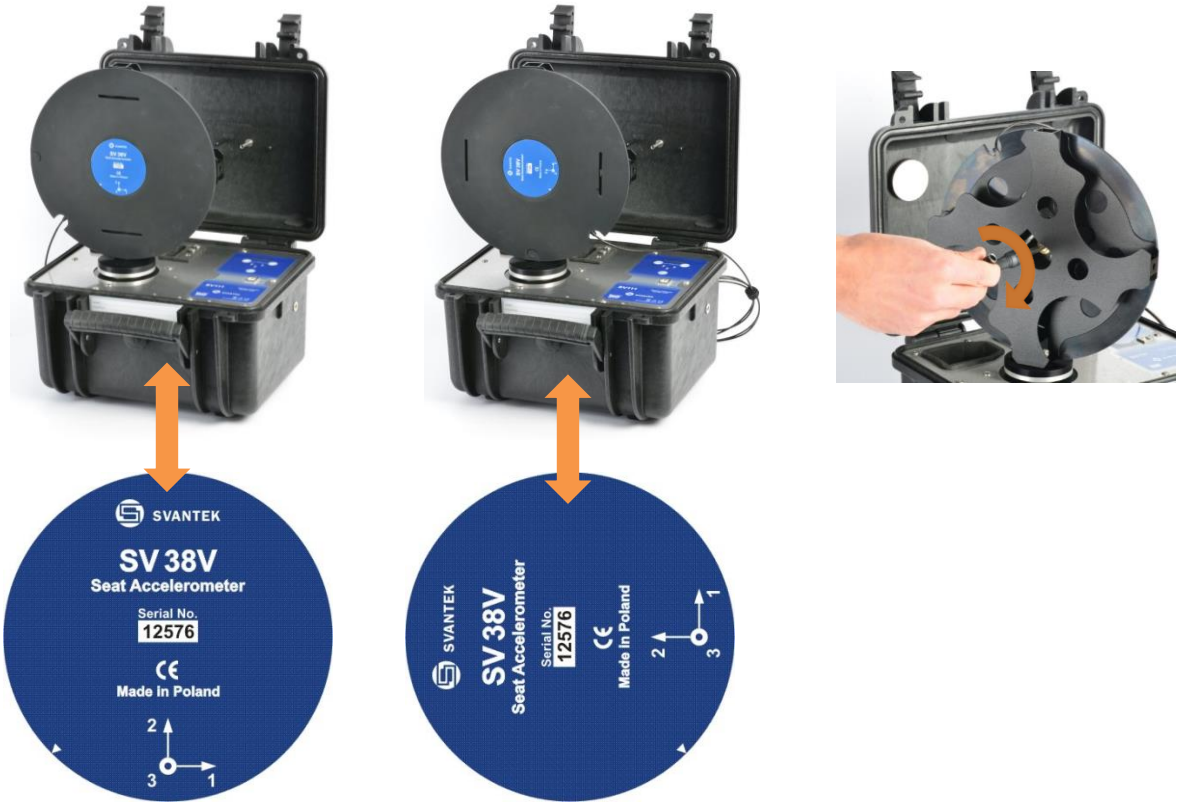


- Unscrew the central screw of the whole-body sensor and mount the sensor on the support system using the 10mm short screw.



When screwing the whole-body sensor to the support system, the screw should be tightened until a noticeable resistance is felt (maximum torque 2 Nm).

- When calibrating axis 1 or 2 position the sensor according to the calibrated axis (channel) and tighten the fixing screw.



- When calibrating axis 3, place the support system with the tested sensor in the horizontal position on the adapter and tighten the fixing screw.

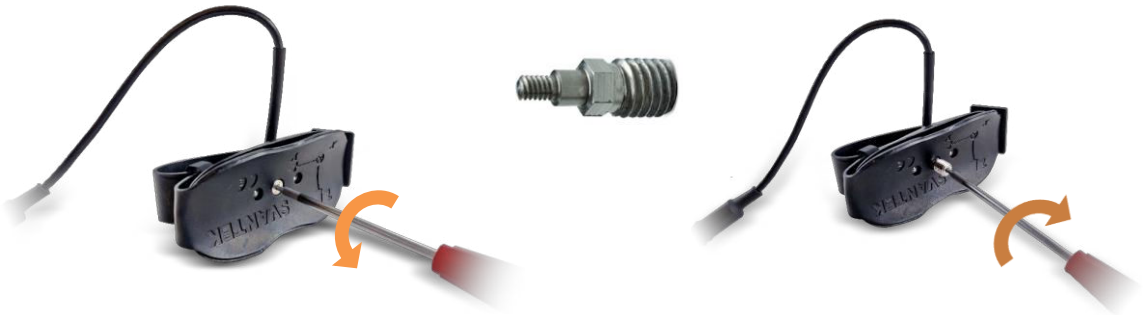
12 Calibration of the SV 105 Hand-Arm sensor

The SV 105 Hand-Arm sensors should be calibrated at 79.58 Hz only.

The description of calibration of SV 105 Hand-Arm sensors is given based on its **SV 105D** modification with the use of the **SA 105D** dedicated adapter. This adapter is compatible with all previous modifications of SV 105. At the same time all previous modifications of SV 105 can be calibrated with the use of their dedicated adapters and the calibration description presented in the previous SV 111 User manuals.

To calibrate the SV 105D Hand-Arm sensor, use the **SA 150C** belt with the greatest curvature.

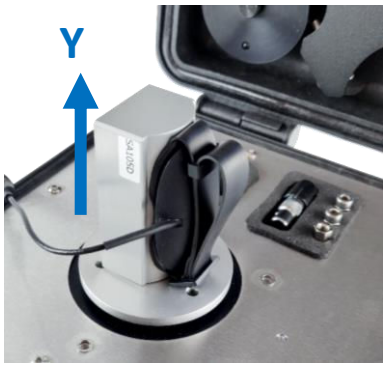
- Screw the SA 150C belt to the SV 105D sensor with the special screw from the SV 105D kit using for that a special 1.5mm Allen screwdriver (both included in the SV 105D kit). If the belt has been screwed to the sensor with the normal screw, must be unscrewed and screwed again with the SA 105D screw.



- Apply the twisted sensor and belt to the SA 105D adapter (the SV 105D must be positioned so that the cable faces the side of the adapter without the thread hole). The adapter has a nut that tightens the SV 105D sensor to the SA 105D adapter when twisted. To prevent the belt from dangling, it should be positioned as shown in the photo below.

- Attach the calibration adapter with the vibration sensor to the calibrator's shaker using the special stud (supplied in the SV 105 kit.

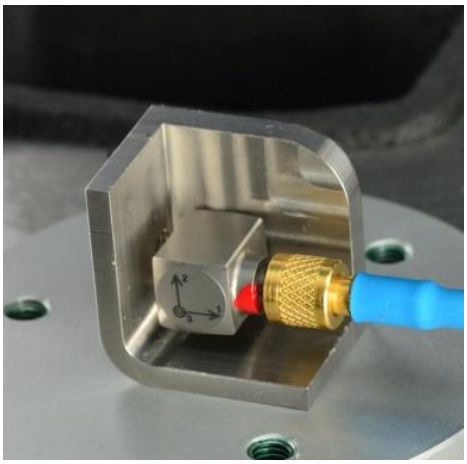
The positioning of the adapter with the sensor for calibration of the X-axis, Y-axis and Z-axis should be as shown in the photos below. For this use the appropriate hole in the adapter for the stud.



13 Calibration of the SV 3023M2 accelerometer

The SV 3023M2 accelerometer is mounted on the shaker using a special adapter (SA 44). The SA 44 adapter set includes two studs M5/M5 and M5/M3. The M5/M3 stud serves to fix the accelerometer to the adapter. Another M5/M5 stud serves to fix the adapter with the accelerometer to the shaker.

The SA 44 adapter allows you to calibrate the SV 3023M2 accelerometer in all directions.



14 Calibration of the general-purpose accelerometer

The general-purpose accelerometer (for example, SV 80) is mounted directly on the shaker using a special stud, included in the accelerometer kit.

15 Programming

- Turn on the power by pressing and holding the two buttons simultaneously.

- The unit type information is displayed.

- When the battery level is low, 'LOW BATTERY' is displayed every 30 seconds.

- Level the unit according to the spirit level information.
  - Move front side up
  - Move front side down
  - Move left side up
  - Move left side down

- When the level is reached, the display shows 'levelling ok' for 5 seconds and then automatically switches to the vibration parameter setting menu.

It is possible to skip the levelling procedure, but it is strongly recommended that it is carried out before each calibration.

The spirit level can be started at any time from the programme submenu.

- After levelling, the unit displays the default values for the vibrations parameters.

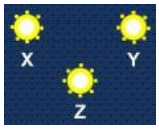
- You can change the values by pressing the 'Freq.' button in the following order: 15.92, 79.58, 159.2, 636.6 Hz.

- Depending on the set frequency value, the vibration level can be set according to the following table.

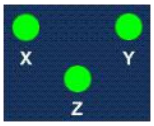
Frequency	15.92	79.58	159.2 Hz	636.6	**Hz**
Level	1; 2	1; 2; 3; 4; 5; 6; 7; 8; 9; 10	1; 2; 3; 4; 5; 6; 7; 8; 9; 10	1	$\frac{\mathbf{m}}{\mathbf{s^2}}$

- When the vibration parameters are set, start the shaker by pressing the 'Start/Stop' button.

The diodes will flash yellow (orange) while the calibrator is levelling.



- If the vibrations are stable, the diodes will light up green and the display will show 'Level OK'.



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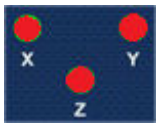
- In the special cases described below, some diodes may have red lights. The explanation of the red diodes is displayed on the screen.



THD (Total Harmonic Distortion) – means that the harmonics on the Z axis exceed the threshold of 5% (-26 dB) of the reference vibration level.

For example, when the vibrations are set at ≈16 Hz, 1 m/s^2 (120 dB), then the total amount of vibrations at frequencies n*16 HZ (32, 48, 64, 80,...) cannot exceed 0,95 m/s^2(94 dB).

SV 111 compensates for harmonic distortion.

X Y Vibration means that the vibration level in the X or Y direction (corresponding diode is lighting red) is higher than 10% (-20dB) of the vibration level generated in the Z direction.

This means that both types of error have occurred at the same time.

The unit cannot reach the set parameters and it stops generating vibrations.

- While the shaker is operating, the set parameters can be checked by pressing either the **<Level>** or **<Freq.>** button.
  The set parameters are displayed for 5 seconds.

- To stop the shaker, press the **<Start/Stop>** button.

- To switch off, press and hold both buttons.

16 General Care and Cleaning

- Remove the sensor and switch off the unit.
- Disconnect the unit from the power supply.
- Wipe the surface of the unit with a cloth moistened with a mixture of warm water and detergent.
- After cleaning, wipe the unit with a dry cloth and wait until the surface is completely dry.
- Do not immerse the unit in liquids as this may damage it and cause electric shock. Only the external parts of the unit should be cleaned.

17 Technical data

Calibration signal parameters					
Frequency	15.92	79.58	159.2 Hz	636.6	**Hz**
Vibration accelerations (RMS)	1	1; 2; 3; 4; 5; 6; 7; 8; 9; 10	1; 2; 3; 4; 5; 6; 7; 8; 9; 10	1	$\frac{\mathbf{m}}{\mathbf{s^2}}$
Vibration velocities (rms)	10	2, 4, 6, 8 10, 12, 14, 16, 18 20	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	0.25	$\frac{\mathbf{mm}}{\mathbf{s}}$
Vibration displacement (rms)	100	4, 8, 12, 16, 20, 24, 28, 32, 36, 40	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	0.0625	**µm**
Amplitude error	Less than ± 3%				
Frequency error	Less than ± 0.5%				
Transverse vibration	Less than 10% of main direction				
Harmonic distortion	<5	<3	<3	<3%	**%**
General					
Maximum weight of tested object	1000	300	200	200	**g**
Sensor mounting	Threaded hole M5 x 12 mm; Seat adapter for SV 100, SV 38, SV 38V Mounting disc for attaching with Beeswax or SA 38 adapter				
Levelling off time	Typically 15 ÷ 20 seconds, 60 seconds max				
Working conditions					
Temperature range	-10°C ÷ 50°C				
Humidity range	25% ÷ 85%				
Power supply					
Battery type	Rechargeable 6V/12Ah				
Continuous operating time	Up to 20 hours				
Automatic switch off	From 5 to 60 minutes adjustable				
Charging time	Less than 10hours				
Power supply for charger	15 W; 8÷24 V				
Overall weight and dimensions					
Weight	8.2 kg (incl. battery)				
Dimensions	395 x 270 x 194 mm				

18 Declaration of Conformity

SVANTEK

INSTRUMENTATION FOR SOUND & VIBRATION
MEASUREMENTS AND ANALYSIS

ISO 9001
ZETOM-CERT

CE Declaration of Conformity

No. SV111-CE-EN/06/2019

Manufacturer:	**SVANTEK Sp. z o. o**
Address:	Strzyglowska 81 04-872 Warszawa Poland
Kind of product:	VIBRATION CALIBRATOR
Type:	**SV 111**

Directive: **Electromagnetic Compatibility Directive** (EMC) 2014/30/WE

Standards: EN 61326-1:2013 Measurement equipment: EMC emission and immunity

EN 55011:2016 Radio-frequency disturbance characteristics - Limits and methods of measurement

Auxiliary industry standards:

ISO 8041-1:2017 Human response to vibration -- Measuring instrumentation -- Part 1: General purpose vibration meters

I, the undersigned, representing the manufacturer, declare in sole responsibility, that the product specified above, to which this declaration relates, conforms to the above mentioned Directives and Standards:

Place of issue: **Warsaw, Poland**

Date of issue: 4 06 2019

Wiesław Barwicz, General Manager .....
(signature)

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KRS 000192065
Initial Capital 100 000 PLN

Appendix A Recalibration

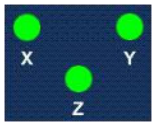
Recalibration is required at all frequencies where the vibration level is set as shown in the table below:

Frequency	Vibration level
15.92 Hz	1m/s^2
79.58 Hz	10m/s^2
159.2 Hz	10m/s^2
636.6 Hz	1m/s^2

Recalibration for frequency 15.92 Hz:

- Install the reference sensor and start the shaker with vibrations parameters 15.92 Hz and 1m/s^2.

- Wait until the vibrations are steady (the LEDs are lit with a steady green light and the message “Level OK” is displayed).



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- Read the vibration level value from the reference sensor. If it is the same as the set one, select the next frequency. If it is different, it is necessary to enter/modify the calibration coefficient.

- Stop the shaker by pressing the **<Start/Stop>** button.

- When the unit is idle, press the **<Level>** and **<Freq.>** buttons simultaneously to enter the submenu.

- The first item displayed in the sub-menu is the battery power status.

- The sub-menu items can be changed by pressing either the **<Level>** or **<Freq.>** button.

Other sub-menu items displayed are:

- Levelling,

- Previously entered calibration coefficient,

- Item where the new calibration coefficient can be set.

- To check the calibration coefficient currently entered:
  - when ‘CALIBR. VIEW’ is displayed

  - press the ‘Level’ and ‘Freq.’ buttons simultaneously

  - the currently entered value will be displayed on the screen.

- To change the calibration coefficient:
  - when “SAVE CALIBR.” is displayed

  - press the **<Level>** and **<Freq.>** buttons simultaneously

- the MODIFY screen will be displayed.

- To decrease the currently displayed value by 0,05 dB, press the **<Level>** button.

- To increase the currently displayed value by 0,05 dB, press the **<Freq.>** button.

- The currently set value is displayed on the screen.

- To confirm the set value, press the **<Level>** and **<Freq.>** simultaneously.

- To save the set value, press **<Level>**.

- To exit without saving, press **<Freq.>**.

- After saving, a confirmation screen will appear.

As the calibration coefficient is set, it is recommended to repeat the measurement with the reference sensor.

Appendix B Defining calibration coefficient

Use one of formulas bellow:

- $C = 20 \log_{10} \frac{A}{A_0}$ **[dB]**

Where:

A – reference sensor vibration level

A_0 – selected vibration level of the calibrator

- **C = Ar – Ac,**

Where:

Ac- selected vibration level of the calibrator [dB]

Ar – reference sensor vibration level [dB].